

## PRELIMINARY GEOLOGIC MAP OF THE GILEAD SYNCLINE AREA, NORTHEAST BROOKS RANGE, ALASKA

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The Gilead Creek along the northeastern Brooks Range front exposes multiple levels of mechanical stratigraphy that have ages that range from Pennsylvanian to Tertiary that make up structures formed by shortening in two directions (NNW-SSE and NW-SE). The Gilead Creek and Gilead syncline area provides insight into the transition from the northeast Brooks Range (Alaska) to the arctic foothills. The latest structure in the study area is probably the WSW-plunging Echooka anticlinorium, which is the largest (first order, 1°) structure in the area. The Echooka Formation is overlain by a detachment in the Kavik (shale) member of the Triassic Ivishak Formation. ENE-trending 3° folds to the N and NNW-dipping back-thrusts to the south formed in Triassic Ledge Sandstone and the Shublik Formation. Up-section, is the Jurassic to Lower Cretaceous Kingak Shale, which serves as a detachment interval between the Shublik and Mid Cretaceous Gilead Sandstone. The 2° Gilead syncline, which formed in the thick and competent mid-Cretaceous Gilead sandstone before the local range front formed, overlies the Kingak shale. To the NW, NE-trending 3° and 4° folds and local thrust faults are superposed on the north limb of Gilead syncline and continue to the NW in Gilead sandstone and overlying Upper Cretaceous units of alternating sandstone and shale. Changes in fold geometry are illustrated on the geologic map and in cross section moving from the northwest to the southeast in the Gilead sandstone. Higher amplitude close to overturned folds are seen in the Early to late Turonian sandstones in the northwest part of the study area adjacent to the Gilead Creek and long wavelength folds are present in the southeastern most Gilead sandstone outcrops. Changes in fold geometry of the Gilead sandstone and overlying Early to late Turonian sandstones are interpreted to be a result, at least in part, of the lithologic changes in the Gilead sandstone.